



Tumor of the Heart Diagnosed by Magnetic Resonance Imaging

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A case of liposarcoma metastatic to the heart is presented. This is a very rare entity and only three prior case reports could be found. Magnetic resonance imaging was successfully used to visualize the tumor. These

images compared favorably with a two-dimensional echocardiographic study and postmortem examination.
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Magnetic resonance imaging is a recently developed, safe noninvasive technique that can be utilized to obtain images of internal organs. With the use of electrocardiographic gating, high resolution images of cardiac structures have been obtained (1,2). Other studies (3) have demonstrated its ability to diagnose tumors in human subjects and that this ability compares very favorably with images obtained by computerized tomography in the same patients. In one animal study (4), images obtained by magnetic resonance techniques were found to be highly sensitive in identifying the size and extent of fibrosarcomas.

We report here a case of a liposarcoma that metastasized to the myocardium, pericardium and pleura. Using magnetic resonance imaging, we were able to visualize these metastases. The images obtained compared favorably with two-dimensional echocardiographic images and the postmortem findings.

Case Report

A 61 year old man with a 20 year history of progressive metastatic liposarcoma was admitted for cis-platinum chemotherapy.

Physical examination showed him to be chronically ill and cachectic, but in no acute distress. Vital signs showed

a blood pressure of 100/70 mm Hg without evidence of pulsus paradoxicus, a heart rate of 100 beats/min and a respiratory rate of 20/min. There were multiple subcutaneous soft tissue masses over the chest wall. Neck veins were flat and lungs were clear. Cardiac examination was notable for a three component friction rub. The abdomen was distended and there was 4+ pitting edema of both legs.

Chest roentgenogram showed a right pleural mass (Fig. 1). Electrocardiogram showed sinus tachycardia with non-specific ST-T wave changes.

Because of the friction rub, a two-dimensional echocardiogram was performed and demonstrated a moderate-sized pericardial effusion and evidence of a thickened and nodular pericardium. In addition, a large mass was noted to be attached to the right atrium and ventricle (Fig. 2).

Magnetic resonance imaging. Imaging was performed with a commercially available 0.6 tesla unit (Technicare, Incorporated). It has a hydrogen nucleus resonance frequency of 25.4 MHz. Multiplane selective irradiation technique was used for acquisition of data, and sectional images were reconstructed with two-dimensional Fourier transformation technique. Reconstruction matrix was 128 vertical \times 256 horizontal pixels. It was displayed in 256 gray levels, the brightest areas representing tissue with greatest magnetic resonance signal intensity. Images were obtained using spin echo pulse sequences at time delays of 30 and 500 ms between application of the radiofrequency pulse and receipt of the corresponding signal.

Electrocardiographic gating was performed using low resistance electrocardiographic leads and a Hewlett Packard telemeter (model 71001A). The telemetry transmitter was placed next to the patient within the bore of the magnet and the receiver was located in the adjacent room.

Figure 3 demonstrates the magnetic resonance image obtained. There is evidence of a mass attached to the right

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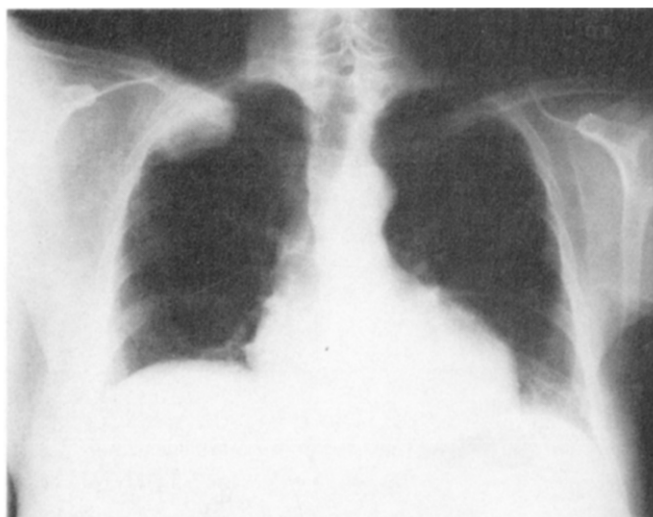


Figure 1. Chest roentgenogram shows evidence of a large right pleural mass in the upper region of the right lung. The heart shadow is enlarged.

atrium and ventricle associated with a thickened nodular pericardium and a moderate-sized pericardial effusion. In addition, pleural and chest wall masses were seen.

Clinical course. The patient's subsequent hospital course was complicated by renal failure and rapid clinical deterioration. He died 6 days later.

Postmortem examination. A large lobulated mass was found to be attached to the right atrium and ventricle and there was evidence of a thickened nodular pericardium associated with a moderate-sized pericardial effusion (Fig. 4). In addition, a small mass was seen adjacent to the left ventricle.

Figure 2. Apical four chamber two-dimensional echocardiogram showing evidence of a large tumor mass (T) along the right heart border. In addition, the pericardium is noted to be nodular and a small pericardial effusion (PE) is present. The left ventricular mass was not visualized in this projection. LA = left atrium; LV = left ventricle; RA = right atrium; RV = right ventricle.

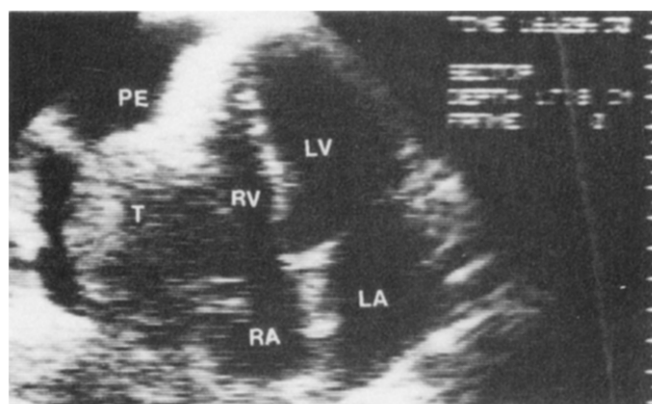


Figure 3. Magnetic resonance image obtained in a plane similar to that of the echocardiographic image. Again, a large tumor mass (T) is seen along the right heart border. In addition, there are multiple pleural tumors noted. A small pericardial effusion (P) is again visualized. Other abbreviations as in Figure 2.

Discussion

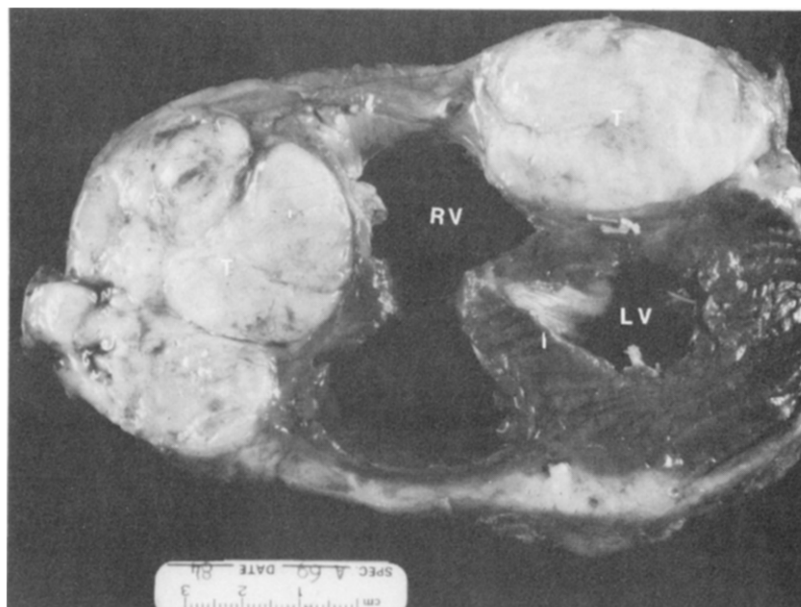
Previous studies of metastatic tumors of the heart. Metastatic tumors of the heart are not uncommon. Frequently, they are clinically silent and may occur in up to 22% of patients with a malignant tumor (5,6). When clinically detected, it is usually because of the presence of pericardial pain, arrhythmias, signs of tamponade, unexplained congestive heart failure or a friction rub (7).

Liposarcoma is an unusual tumor. It can occur as a primary tumor in the heart (8,9), mediastinum (10) and pericardium (11). Metastatic liposarcoma to the heart is very rare. In a review of 53 cases over a 17 year interval at the Hospital of the University of Pennsylvania (12), none was found to be metastatic to the heart. We were able to find only three prior reports (13-15) of cardiac metastasis from distant primary sites.

Present case. In this case, we were able to visualize the metastatic tumor to the heart and accurately localize its position. Prior reports have documented the ability of cardiac-gated computerized tomography (15) and two-dimensional echocardiography (16,17) to visualize cardiac tumors. Hence, it would appear that magnetic resonance imaging will be an additional noninvasive technique to visualize cardiac tumors.

Potential uses of magnetic resonance imaging. In a recent review (18), the potential uses of magnetic resonance imaging in clinical cardiology were discussed. Among its

Figure 4. Postmortem specimen shows evidence of a large tumor mass along the right heart which corresponds to the tumors imaged by two-dimensional echocardiographic and magnetic resonance imaging. The left ventricular (LV) tumor was not visualized in the planes depicted in Figures 2 and 3. Other abbreviations as in Figure 2.



advantages are its ability to obtain high resolution, three-dimensional cardiac images without the use of ionizing radiation and without the technical limitations caused by interference from bone or lung. In addition, this technique is unique in its ability to characterize the degree of myocardial perfusion and patency of the coronary arteries without the use of contrast agents. Its disadvantages include its high cost, relatively slow rate of image acquisition and its inability to be performed on acutely ill patients, patients with pacemakers and patients with metallic clips from prior surgery.

In regard to imaging of intracardiac masses and metastatic tumors, magnetic resonance imaging might be particularly helpful in determining whether the mass imaged was vascular or not and, in the future, may be able to characterize the tissue type of the mass. The precise role of magnetic resonance imaging of cardiac masses is yet to be determined.

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